REMOTE SENSING AND SIGNATURE ANALYSIS

Remote Sensing and Signature Analysis research areas include remote sensing technologies, signal and image processing, characterization and integration, multispectral and hyperspectral imaging (MSI/HSI) analysis, radiation transfer through the atmosphere, passive coherent location (PCL), modulation of the environment, and computational processes of large data sets. These research areas support a new academic and research effort for Measurement and Signature Intelligence (MASINT). MASINT is technical intelligence information obtained by quantitative and qualitative analysis of data (any wavelength, time-dependence, or modulation) derived from specific technical sensors, passive or active, for the purpose of identifying any distinctive features (signatures) associated with the detection and measurement of the emitter. Past research has involved Radiant Brass conventional munitions signatures and rocket plume detection, measurement, and characterization. Planned research involves MSI/HSI, error analysis and correction for sensor platform irregularities, non-cooperative target identification, co-channel interference characterization and mitigation, PCL exploitation of frequency-modulated signals, and novel computer architectures and processing algorithms for near-real time analysis of data streams from multiple sensor modalities such as SAR and hyperspectral radiometers.

Numerous experimental and computational facilities are used for student research. These include a Remote Sensing Laboratory, a Satellite Simulation Facility, and Solid-State Device Fabrication Facility. The Remote Sensing Laboratory includes state-of-the-art spectrometers, radiometers, optical multi-channel analyzers, and telescopes. Modeling facilities include in-house high-end personal computers for unclassified work. For large computational requirements and/or classified work, world-class, high-speed parallel processing systems are available at the National Air Intelligence Center. These systems allow development of algorithms for the integration and exploitation of data streams from multiple sensor modalities such as SAR and hyperspectral radiometers.

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SOME RECENT PUBLICATIONS:

"Spectral and Temporal Characterization of Conventional Munitions Detonations", AIAA Space Conference and Exposition, Albuquerque, NM, August 2001, William F. Bagby, Jay A. Orson and Glen P. Perram.

"Collection of Infrared Detonation Signatures and Characterization of Spectral Features", Workshop of Infrared Emission Measurements by FTIR, Quebec, Canada, Feb 2000, J. Orson and G. Perram.

“Preliminary Test Report from AFIT Sensors for Brilliant Flash Tests,” 19 August 2002, Anthony N. Dills, George A. Zimmer, and Glen P. Perram.

“Infrared Signatures from Bomb Detonations,” Infrared Physics & Technology, Accepted for Publication, Jay A. Orson, William F. Bagby and Glen P. Perram.